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Impact of Autogenic Relaxation Therapy on Psychological Parameters and Salivary Cortisol Levels Among Mothers of Special Children

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Abstract **Background:** Mothers of children with intellectual disabilities face greater challenges and stress compared to mothers of children without disabilities. Autogenic relaxation therapy is a powerful technique for reducing stress and anxiety. This study aims to assess the effectiveness of Autogenic Relaxation Therapy (ART) on psychological parameters and salivary cortisol among mothers of special children. **Method:** A prospective quasi-experimental study design was adopted, with 200 mothers assigned to either an experimental (n = 100) or control group (n = 100) by using non probability convenience sampling technique. The experimental group received Autogenic Relaxation Therapy twice a week for 8 weeks while the control group was not given any intervention during the time of data collection and they will be provided with intervention only after the data collection period. Psychological parameters such as stress, anxiety and depression were assessed using standardized scales such as becks depression inventory, becks anxiety inventory and berry and jones parental stress scales and salivary cortisol levels were estimated using the ECLIA method. **Results:** Significant reductions in stress (21.5%), anxiety (30.39%) and depression (27.68%) were observed in the experimental group. Salivary cortisol levels decreased by 41% in the experimental group, while increasing by 3.8% in the control group. **Conclusion:** The study demonstrates that the intervention was effective in significantly reducing psychological distress among parents of intellectually disabled children. Participants in the experimental group showed marked reductions in stress, anxiety and depression levels, along with a substantial decrease in salivary cortisol, a biological marker of stress.

Key Words Autogenic Relaxation Therapy, Caregiver Burden, Mothers of Special Children, Salivary Cortisol

INTRODUCTION

Children with intellectual disabilities create unique challenges for their parents, leading to greater parenting stress compared to parents of children without disabilities. Parents of disabled children often face issues such as social isolation, mental stress, depression, grief and financial concerns [1]. Mothers, who are often the primary caregivers, frequently face high caregiver burdens marked by psychological, physical and financial stress [2]. This constant caregiving can lead to chronic fatigue, sleep disturbances, depression and even burnout, often exacerbated by limited resources and societal stigma [3,4]. Studies report that around 5-6% of children globally have special needs, with rates varying by region [5]. In India, the prevalence is significant, with variations across different states [6]. Such statistics underscore the demand for inclusive healthcare and educational support, along with services for caregiver mental health and well-being. The caregiver burden affects not only mothers' physical health but also their mental health [7], leading to a high prevalence of depression, especially among those without adequate support systems. Addressing these issues is vital, as the well-being of primary caregivers directly influences the care quality and developmental outcomes for children with special needs [8,9].

Also, we observed in a cross-sectional observational study that 94% of mothers and 66.7% of fathers who are parents of intellectually disabled children suffer from an anxiety or depression or from both. Especially, anxiety was experienced by 91.8% of mothers; depression by 66.3% and 64.3% experienced both. Only among fathers, 57.6% had anxiety, 35.4% had depression and 26.3% had both [10].

Cortisol, often referred to as the "stress hormone," plays a crucial role in understanding the neurobiology of mental disorders exacerbated by high stress levels. Produced in the adrenal gland from cholesterol, cortisol levels are closely tied to perceived stress [11]. The hypothalamus-pituitary-adrenal (HPA) axis regulates cortisol, which follows a circadian rhythm, typically peaking in the morning [12].

Chronic activation of the HPA axis, leading to persistently elevated cortisol levels, is a hallmark of toxic stress response and has been frequently linked to anxiety and major depression [13,14].

A study of 4,935 children and their parents found significantly higher mental health issues. Parents of adolescents (12-17 years) showed increased mental health service use and costs, while those of younger children (4-11 years) faced unmet mental health needs, indicating a gap in support services [15].

Autogenic relaxation therapy is an effective technique for reducing stress and anxiety. Developed by Johannes Heinrich Schultz, this method involves daily practice sessions of visualization and relaxation. By focusing on six key areas: Heaviness, warmth, regular heartbeat, regular breathing, abdominal relaxation and cooling of the head, individuals can calm their minds and bodies. With its simplicity and ease of use, autogenic relaxation therapy is a valuable tool for achieving relaxation and reducing stress [16]. Recent study found that Autogenic Relaxation Therapy (ART) effectively reduced anxiety, improved mood and enhanced coping across diverse populations. ART was often superior to no treatment or comparable interventions [17].

The research gap lies in the lack of studies on the effects of Autogenic Relaxation Therapy (ART) for mothers of children with intellectual disabilities. While ART has shown benefits in reducing stress and anxiety in general populations, its impact on caregivers, particularly regarding cortisol levels, remains underexplored. This study aims to address this gap by examining ART's effects on psychological well-being and salivary cortisol in mothers of special children.

METHODS

A quasi-experimental design was used to examine the effect of Autogenic Relaxation Therapy on mothers of children with special needs. A total of 200 mothers were recruited from Satya Special School, Puducherry, through a convenience sampling technique. The study sample comprised 100 participants in each of the experimental and control groups. Data collection involved administering demographic data, psychological assessments and salivary cortisol tests to both groups at pre-test. The experimental group then received Autogenic Relaxation Therapy twice a week for 8 weeks, with each session lasting 20-25 minutes. The control group did not receive any intervention. Post-test assessments were conducted at the end of the 12th week for both groups, using standardized instruments to measure psychological parameters and salivary cortisol levels.

Sampling Criteria

Inclusion and Exclusion Criteria: Inclusion criteria of the study were all mothers between 18-55 years identified with borderline to moderate depression, having special children with disabilities like learning disabilities, intellectual disabilities, autistic spectrum disorder, cerebral palsy whose age between 3-18 years enrolled in satya special school and Mothers who have diagnosed with severe depression, suicidal ideas, known case of psychiatric illness, receiving treatment for depression and anxiety, under steroid therapy were excluded.

Data Collection Instrument

The data collection instrument comprised three parts. Part 1 included demographic variables such as age of the mother, education, marital status, age at marriage, type of marriage, child's age, birth order, type of disability, duration of treatment in special school, type of family, monthly income, residential area, number of disabled children and substance use by the spouse. Part 2 consisted of standardized self-rating scales to assess psychological status, including the Beck Depression Inventory, Beck Anxiety Inventory and the Berry and Jones Parental Stress Scale (18 items). Part 3 involved assessment of salivary cortisol levels using the ECLIA method at Rainbow Clinical Laboratory, Puducherry, with a reference range of 3.7-19.4 µg/dL.

Intervention

The mothers in the experimental group were provided with a mat and instructed to sit in a quiet room. On the day of data collection, they received a demonstration of Autogenic Relaxation Therapy (ART). The therapy session began with 3 minutes of guided imagery, during which the investigator provided verbal commands, such as feeling heavy, warm, relaxed and calm, allowing the mothers to passively listen. The ART sessions were conducted twice a week for 8 consecutive weeks, with each session lasting approximately 20-25 minutes. To ensure adherence, telephonic reminders were sent to the experimental group twice a week. After the data collection period, the control group also received ART. Ensuring both groups benefited from the therapy.

Data Collection Procedure

Data collection for this study began with obtaining written consent from the mothers of children with special needs. Demographic variables were gathered using a subject data sheet, followed by the administration of the Depression Inventory Scale to assess the depression levels of the participants. Mothers who scored between 17 and 30 on the scale, indicating borderline to moderate depression, were included in the study. Following the depression assessment, further evaluation of co-morbid stress and anxiety was conducted using the Berry and Jones Parental Stress Scale and Beck's Anxiety Inventory Scale. After the psychological assessments, the mothers were escorted to a private room, where they were provided with a labeled container to collect

a 5 mL saliva sample. These saliva samples were then submitted to a laboratory technician for analysis. Data was collected at four key time points: baseline, midline (4 weeks), endline (8 weeks) and follow-up (12 weeks, with a one-month interval), ensuring a comprehensive assessment of the intervention's effects over time.

Statistical Analysis

The effectiveness of autogenic relaxation was analyzed using two-way repeated measures ANOVA with $p \leq 0.05$ considered statistically significant. Data analysis and graphing were performed using Sigma Plot 13.0.

RESULTS AND DISCUSSION

Socio Demographic Variables

The demographic characteristics of the 200 mothers in the study revealed that the majority (76.5%, n = 153) were above 31 years old. Most of the mothers (55%, n = 110) were Hindus and a significant proportion (58.5%, n = 117) lived in urban areas. The educational background of the mothers showed that 55% (n = 110) had schooling level education and 46% (n = 92) worked as general workers. A majority of the mothers (74.5%, n = 149) were married below 21 years old, with an equal distribution of consanguineous and non-consanguineous marriages. The characteristics of the children showed that 72% (n = 144) were below 10 years old, 69.5% (n = 139) were male and 77.5% (n = 155) were firstborn. Additionally, 45.5% (n = 91) of the children had intellectual disabilities. The treatment and support patterns revealed that half of the children received treatment for more than 3 years and 87.5% (n = 175) of the mothers had only one child with a disability. Furthermore, a majority of the spouses used substances and sadly, 65% (n = 130) of the mothers did not receive family support.

Stress, Anxiety and Depression

Table 1 and Figure 1 shows a 3% increase in stress in the control group and a 21.5% decrease in the experimental group over 12 weeks. While overall group differences were not significant ($p<0.001$, significant differences were found across weeks ($p<0.001$) and in the group×time interaction ($p<0.001$).

Table 2 shows a 4.6% rise in anxiety in the control group and a 30.39% reduction in the experimental group over 12 weeks, with significant group, time and interaction effects ($p<0.001$).

Table 3 reports a 5.49% increase in depression in the control group and a 27.68% decrease in the experimental group over 12 weeks. Significant effects were found for group, time and their interaction ($p<0.001$).

Salivary Cortisol

Table 4 shows a 3.8% rise in cortisol levels in the control group and a 41% reduction in the experimental group over 12 weeks. Though overall group differences were not significant ($p = 0.226$), significant time and group×time effects ($p<0.001$) indicate the intervention's impact.

Table 5 shows significant positive correlations between cortisol levels and stress ($r = 0.431$), anxiety ($r = 0.489$) and

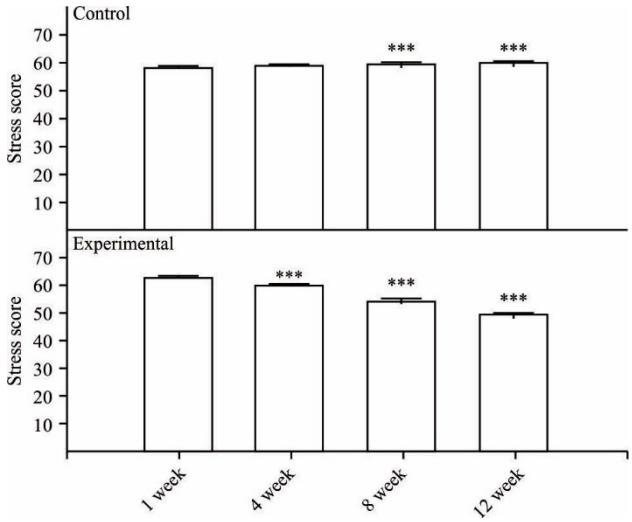

Figure 1: Comparison of control and experimental groups on stress score

Table 1: Comparison of mean score on stress among mothers of special children (N = 200)

S. No.	Test comparisons	Control group (Mean, SE)	Experimental group (Mean, SE)	p-value
1.	Baseline (Pretest)	58.270±0.809	62.500±0.994	F = 11.677 p<0.001
	4thweek	58.730±0.780	59.780±0.972	
	8thweek	59.380±0.742	54.170±0.868	
	12thweek(Posttest)	60.060±0.712	49.050±0.868	
2.	Among Control and Experimental group			F = 5.507 p<0.001
	Among tests (baseline/4 week/8 week/12 week)			F = 249.7 p<0.001
	Interaction (groups×week)			F = 421.3 p<0.001
3	Baseline assessment (Control and Experimental)			t = 3.525 p<0.001
	Significance between 12 week among Control and Experimental			t = 9.175 p<0.001
4	Within Control (baseline and 12 week)			t = 5.429 p<0.001
	Within Experimental (baseline and 12 week)			t = 40.79 p<0.001

Table 2: Comparison of mean score on anxiety among mothers of special children (N = 200)

S. No.	Test comparisons	Control group	Experimental group	p-value
1	Baseline (Pretest)	31.040±0.610	29.740±0.711	F = 172.329 p<0.001
	4thweek	31.440±0.574	27.950±0.677	
	8thweek	32.040±0.544	23.230±0.495	
	12thweek (Posttest)	32.040±0.516	20.700±0.361	
2	Among Control and Experimental group			F = 67.415 p<0.001
	Among tests (baseline/4 week/8 week/12 week)			F = 172.329 p<0.001
	Interaction (groups×week)			F = 317.004 p<0.001
3	Baseline assessment (Control and Experimental)			t = 1.611 p = 0.109
	Significance between 12 week among Control and Experimental			t = 14.585 p<0.001
4	Within Control (baseline and 12 week)			t = 5.305 p<0.001
	Within Experimental (baseline and 12 week)			t = 33.534 p<0.001

Table 3: Comparison of mean score on depression among mothers of special children (N = 200)

S. No.	Test comparisons	Control group (Mean, SE)	Experimental group	p-value
1.	Baseline (Pretest)	22.760±0.391	22.790±0.389	F = 161.608 p<0.001
	4thweek	23.020±0.346	22.060±0.370	
	8thweek	23.530± 0.321	18.590±0.344	
	12thweek (Posttest)	24.010±0.307	16.480±0.283	
2.	Among Control and Experimental group			F = 52.904 p<0.001
	Among tests (baseline/4 week/8 week/12 week)			F = 161.608 p<0.001
	Interaction (groups×week)			F = 342.579 p<0.001

Table 4: Group Comparison of mean score on salivary cortisol among mothers of special children (N = 200)

S. No.	Groups and comparisons	Tests	Cortisol (ng/L) Mean+SE
1	Control	Baseline	5.110+0.586
	Control	12-week	5.305+0.573
	Experimental	Baseline	5.368+0.628
	Experimental	12-week	3.155+0.447
2	Among Control and Experimental group		F = 1.478 p = 0.226
	Among tests (baseline/4 week/8 week/12 week)		F = 36.563 p<0.001
	Interaction (groups×week)		F = 52.054 p<0.001

Table 5: Correlation of salivary cortisol with stress, anxiety and depression among mothers of special children

S. No.	Variable 1	Variable 2			
		Cortisol	Stress	Anxiety	Depression
1	Cortisol	-	0.431	0.489	0.417
2	Stress	-	-	0.738	0.738
3	Anxiety	-	-	-	0.845
4	Depression	-	-	-	-

n = 200 (12th week data of control and experimental combined), The values are Pearson's correlation (r), p<0.001, for all correlations

depression (r = 0.417), all with p<0.001, indicating that higher cortisol levels are associated with increased psychological distress. Strong correlations were also found between stress and anxiety (r = 0.738), stress and depression (r = 0.738) and anxiety and depression (r = 0.845), suggesting these psychological factors are closely interrelated.

DISCUSSION

The study results demonstrate a significant impact of the experimental intervention on psychological well-being, highlighting a decrease in stress, anxiety and depression, along with a notable reduction in salivary cortisol levels. Specifically, stress levels in the experimental group decreased by 21.5%, while the control group displayed a 3% increase. Similarly, anxiety and depression were reduced by 30.39 and 27.68%, respectively, in the intervention group, contrasting with increases observed in the control group. These findings are consistent with prior research that emphasizes the relationship between psychological distress and physiological responses. Choi *et al.* [18] established that

heightened stress levels are risk factors for depression and anxiety, which aligns with the outcomes reflected in this study. Furthermore, Reis *et al.* [19] emphasize that effective stress management can lead to a reduction in emotional distress, supporting the significant reductions in anxiety and depression reported after the intervention.

The physiological component of the study is equally noteworthy, particularly the dramatic reduction of 41% in salivary cortisol levels in the experimental group, with results showing significant group×time interaction effects ($p<0.001$). This can be understood through the lens of psychoneuroimmunology, which investigates the relationship between psychological processes and physiological responses, particularly related to the endocrine system [20]. Elevated cortisol levels are frequently associated with psychological distress, further supporting our results—a strong positive correlation exists between cortisol levels and stress ($r = 0.431$), anxiety ($r = 0.489$) and depression ($r = 0.417$) [21]. These correlations emphasize the critical role cortisol plays in both physiological and psychological dimensions of stress and related disorders.

The interrelation among stress, anxiety and depression is reinforced by our findings that these constructs are closely linked, underscoring the importance of comprehensive interventions. Research by Rao and Ashraf [22] highlights how psychological distress affects individuals' mental states and self-esteem, complicating their ability to cope with anxiety and depression. This interconnectedness suggests that relieving one element could favorably influence the others, indicating that a holistic approach to treatment could enhance benefits.

Additionally, our findings resonate with the broader literature on stress management and cortisol regulation. Khayamzadeh *et al.* [23] have indicated that salivary cortisol is a reliable biomarker for assessing psychological changes due to stress, emphasizing why its significant drop in response to the intervention is a key finding. Similarly, Hinnen *et al.* [24] suggested that emotional and physical stress responses are often mediated by cortisol levels, influencing overall psychological health outcomes, though the evidence remains somewhat mixed regarding the exact mechanisms involved.

CONCLUSIONS

The study concludes that the experimental intervention significantly reduced stress, anxiety and depression in participants, with the experimental group showing notable improvements compared to the control group. The intervention also led to a substantial reduction in salivary cortisol levels, which correlated with decreases in psychological distress. The findings highlight the close interrelation between stress, anxiety and depression and suggest that the intervention had a positive impact on both psychological well-being and cortisol regulation. These results support the potential benefits of the intervention in managing psychological distress, with implications for improving mental health outcomes. Further research should explore the underlying mechanisms of the intervention to refine its effectiveness and assess its long-term impact on psychological well-being. Additionally, future studies could investigate the broader applicability of the intervention across different populations and settings.

Limitations

The limitations of the study include a relatively small sample size, which may limit the generalizability of the findings. Additionally, the study's short duration of 12 weeks does not allow for the assessment of long-term effects and the lack of diversity in the sample may affect the applicability of the results to different demographic groups.

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